JPRS L/9922

20 August 1981

West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 9/81)

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APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000400040034-6

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CONTENTS

INDUSTRIAL TECHNOLOGY

SEMINAR HELD ON ADVANCED HANDLING SYSTEMS

Duesseldorf VDI-Z in German No 7 Apr 81 pp 265-266

[Article by Dipl. Phys. Herbert Becker: "Project 'Very Advanced Handling Systems': A Gripper System With Tactile Sensors for Industrial Robots"]

[Text] On February 3, 1981, the Fraunhofer Institute for Information and Dat Processing (IITB, Karlsruhe) sponsored for the second time a seminar which offered an overview of research results from the project "Very Advanced Handling Systems."[1] The participants learned that significant progress has been made in several areas compared to the first seminar,[2] which was held on 2 and 3 April, 1979. Among other things, it was clear from papers and presentations that a control system dynamic analysis of the behavior of programmable manipulators is indispensable if the motion sequences are to be optimized according to prescribed criteria. It was also shown that today manipulating tasks of great complexity can be mastered by computer evaluation of video picture information. By this method it was possible, for example, to perfect the following action sequence for the arm and gripper of an industrial robot:

--to bring the gripper from rest to the neighborhood of a part in a single motion upon recognition of the part on a moving conveyor;

--to track the part and while tracking to orient the gripper with the present position (a statistical quantity) of the part;

--to grasp the part; and finally,

--to place the part upon a pallet in a specified orientation, even when the pallet has translational motion. Another manipulation task which already appears solvable is the generation of a prescribed surface in a spatial coordinate system by form grinding or milling. Pilot tests, in which the parts to be worked are heavy billets with large dimensions, will serve to demonstrate the important advantages which this process presumably offers in comparison to conventional manual working.

A prototype of the Modular Tactile Gripper/Sensor System (MTGS) developed at the Fraunhofer Institute for Production Engineering and Automation (IPA, Stuttgart) was also presented at the seminar. The MTGS is intended primarily for industrial robots which will be employed in manufacturing for the solution of assembly tasks such as joining parts. The MTGS components can be combined to produce a gripper system with

sensors for monitoring assembly forces, assembly motions and gripper forces whose properties are tailored both for a particular industrial robot and for the manipulation task to be accomplished. Such a gripper system has a multi-dimensional compliant structure which permits passive accommodation of tolerance deviations or position errors in joining processes. This compliance in 5 axes is achieved by appropriately designed elastomeric elements. The system is also compliant in the axial direction, up to 8 mm in direct lift.

A gripper system consisting of MTGS components can be coupled to an industrial via a standardized interface. This interface was so designed that an automatic change of grippers or tools is possible for current industrial robots. Also, mechanical, pneumatic and electrical energy as well as electrical signals can be transmitted between a robot's arm and a task-tailored gripper or tool via the interface. A dc stepping motor or a double-acting pneumatic cylinder can be used to actuate the gripper. A parallel-jaw gripper driven by a dc motor and using microswitches in the gripper for controlling gripper forces is available. A pneumatically-driven two-fingered gripper is now under development as is also a screw tool driven by a dc motor which is suitable for joining threated parts under certain conditions.

Tailored adapters are avilable for Unimation's Puma[3] and Olivetti's Sigma[4] assembly robots. An interface controller equipped with a micro-computer employing a Zilog Z-80 processor will also be available in the future.

FOOTNOTES

1. The responsible project agency is the Nuclear Research Center Karlsruhe GmbH, specifically within the framework of the Manufacturing Technology Program of the Federal Ministry for Research and Technology.

2. The papers which were presented at this seminar as well as a summary of the concluding discussion can be found in: Wege zu sehr Fortgeschrittenen Handhabungssystemen" [Paths to Very Advanced Handling Systems] published by H. Steusloff and "Fachberichte Messen, Steuern, Regeln" [Technical Reports on Measurement, Guidance and Control], Vol 4, edited by M. Sybre and M. Thoma; Springer Verlag, Berlin, Heidelberg, New York.

3. "Manipulator fuer die Automatische Montage" [Manipulator for Automatic Assembly], VDI-Z Vol 121 (1979) No 11, p 601.

4. Industrial Handling 78; Becker, H.; VDI-Z Vol 120 (1978) No 8, pp 341-349.

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CSO: 3102/334

INDUSTRIAL TECHNOLOGY

GOVERNMENT SHOWS INTEREST FOR MACHINE TOOL INDUSTRY

Paris AIR & COSMOS in French 4 Jul 81 p 13

[Article: "Hope for an Industry in Crisis...the Government Is Showing Concern for the Machine Tool Industry"; passages enclosed in slantlines printed in boldface]

[Text] During a recent meeting of the Council of Ministers, the President of the Republic stated: "The government is rightly devoting attention to the large industrial problem areas; our economic recovery depends upon solutions to those problems. Among them I attach particular importance to the machine tool sector within which several firms are in difficulty. There can be no question of abandoning an activity so important in our industrial growth.

"I shall ask the government to develop a plan for restructuring this whole sector around several units capable of providing lasting guarantees of employment. In addition, the research and development effort in machine tools, automation, and industrial robots will be intensified so as to enable those fields to utilize the changes now in progress, and to give France a modern and competitive capital equipment industry."

Very recently the Minister for Research, Mr. Chevenement, has included robots among the priority items of his activity.

This interest by the government occurs at the very time that one of the large companies in this sector/, LINE, is experiencing serious difficulties./ Let us recall that the aeronautical industry was directly solicited to give its support to restructuring that sector but does not appear to be interested.

Incidentally, let us note that imports from Japan dominated the proceedings of the European Committee for Cooperation of Machine Tool Industries (CECIMO) during the meeting just held at The Hague.

Even though the 1980 figures are rather satisfactory overall, the delegations nevertheless expressed their /fears of the results of Japanese penetration/ in the market for certain types of machines, in particular, milling stations, numerically controlled lathes, and stamping presses.

The CECIMO members believe that serious intervention on the part of competent authorities, /an order that effective measures/ consistent with the principles of

market economics and the arrangements of the GATT /be taken without delay, with a view toward equalizing competitive conditions between the member countries of CECIMO and Japan./

11706
CSO: 3102/338

FIAT CONTINUES AUTOMATION WITH PURCHASE OF SWEDISH ROBOTS

Milan IL MONDO in Italian 3 Jul 81 p 87

[Article by Paola Capudi: "Robotics--FIAT Chooses the Swedish"]

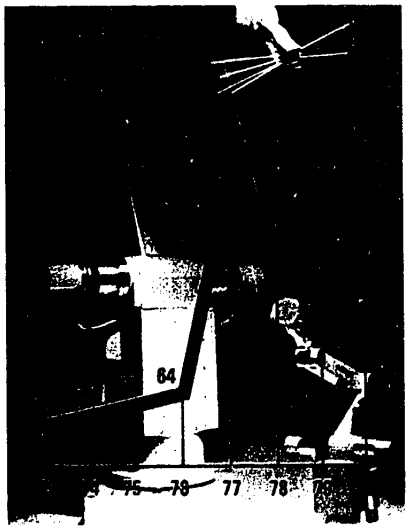
[Text] The 15 skilful laborers that FIAT is about to buy cost 120 million lire each, and are capable of handling an entire assembly line by themselves. The skilled laborers are the IRb-60 robots from the Swedish firm ASEA [Swedish General Electric Company] (the world's third-ranking producer), with which FIAT is about to conclude a contract for the supplying of an initial stock of 15 robots, and another 20 subsequently. They will be used on the first completely automated production line for axles, which is to go into operation in the Turin area within a year and a half.

In FIAT, Comau, Unimation, Cincinnati and Dea robots are already installed in the painting, welding and assembly departments; for the axle line, the choice has gone to the Swedish firm ASEA because of the favorable characteristics/cost ratio. Its robots do indeed have a high degree of flexibility: they are capable of performing all the manufacturing processes, from handling to final assembly, and then, with certain modifications of the brain and body, they can be used for different production work. The IRb-60 has a capacity of 60 kg at 20 cm from the center of the wrist (while the IRb-6 has a 6-kg capacity) and a working field of about 4.5 m diameter, with positioning precision of 0.4 mm, more or less. The adaptation programs, which raise the robot's price, enable it to learn part of the programs automatically or to modify the existing ones in function of the signals picked up by the sensors, to seek the object to be taken, and to vary the speed of movement in relation to the position of the piece to be carried.

Italy is not lagging behind in the robotics sector; in fact, it holds sixth place in the world (after Japan, the USSR, the United States, Sweden, the FRG) in number of robots installed, which was 353 in 1980--considering only the programable multipurpose manipulators--and as high as about 600 if one considers also the simplest robots, that perform only one type of operation. The level of sophistication is high too (one need only think of Dea's Pragma 3000 or Olivetti's Sigma); but the limiting factor (which in certain aspects is a valued quality) of a large part of the Italian products is that of excessive specialization: that is, they are designed in function of a specific production task, and their range of use is therefore limited.

For the automobile industry, automation is a necessary choice, especially for cost-saving, which derives from a productivity increase presently estimated at around 30 percent. But in addition to the economic advantages, the robot offers human advan-

1)



ASEA's IRb-60 and IRb-6

Key:
1. Multipurpose robots installed in Italy (units)

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tages too, especially in the performance of heavy, repetitive and dangerous tasks. The effects of robotics on employment are still negligible: it is calculated that in the entire world, there are presently 12,000 servocontrolled robots (the most sophisticated ones) at work, and that if used on 2 shifts, they would take the place of 24,000 workers (a robot is already economical if it replaces 1 worker on 1 shift).

More than theoretical difficulties, though, the development of robotics still faces practical difficulties, especially in Italy, such as the problem of human resources--that is, the scarcity of technicians with an adequate level of preparation--or cultural difficulties, such as the diffidence of many small industrial operators who are unaware of the limitless range of application of robots in the most diverse fields. Precisely in order to overcome this obstacle (and for obvious commercial reasons), ASEA will inaugurate a Robotics Center near Milan this Fall: 200 m^2 for a robotics section and a hut of another 200 m^2 housing a room-laboratory for experimentation and customer training. The objective is mainly to make the distinct uses clear. The biggest slice of the market at present is the automobile industry, which has a very discontinuous pattern of demand, while if the number of smaller firms were increased, there would be a more stable, and therefore more programable, pattern of sales. The fields of application of the ASEA robots are in particular foundry work and sophisticated manipulation.

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CSO: 3102/325

TRANSPORTATION

BRIEFS

SHORTS 360 UPDATING--Since the LeBourget Salon three more airlines have ordered a total of 10 Shorts 360 airplanes. This brings the number of orders and options received for the new Irish commuter airplane to 21, coming from 21 airlines, including 4 American, 1 British, 1 Colombian, and 1 Australian. On 22 June the prototype had accumulated 20 flying hours, and completely satisfied Shorts' chief test pilot, Lindsay Cumming. The manufacturer recently displayed a scale model of the interior cabin arrangement to more than 250 persons in Washington. Remember that the first production airplane will be delivered to Suburban Airlines at the end of the next year. [Text] [Paris AIR & COSMOS in French 4 Jul 81 p 18] [COPYRIGHT: A. & C. 1980] 11706

CERAMIC FIBERS STUDY GROUP--Lafarge Refactaires, a subsidiary of Lafarge Coppie, and the European Propulsor Company (SEP) are establishing a GIE [economic interest group] for study and research devoted to the development of ceramic fibers. This agreement is the first stage of wider cooperation in manufacture and sale of fibers entering into the composition of sophisticated materials intended, in particular, for aeronautical and space applications. [Text] [Paris LETTRE DE L'EXPANSION in French 6 Jul 81 p 5] [COPYRIGHT: 1981, GROUPE EXPANSION, S.A.] 11706

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